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PATENT APPLICATION

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IN THE
UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s):	**Yoshio Turner et al**	**Confirmation No.:**	**6355**
Application No.:	**10/680,911**	**Examiner:**	**Jason E. Mattis**
Filing Date:	**October 8, 2003**	**Group Art Unit:**	**2616**

Title: NETWORK CONGESTION CONTROL

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TRANSMITTAL OF APPEAL BRIEF

Transmitted herewith is the Appeal Brief in this application with respect to the Notice of Appeal filed on Dec. 28, 2008.

☒ The fee for filing this Appeal Brief is $510.00 (37 CFR 41.20).

☐ No Additional Fee Required.

(complete (a) or (b) as applicable)

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136(a) apply.

☒ (a) Applicant petitions for an extension of time under 37 CFR 1.136 (fees: 37 CFR 1.17(a)-(d)) for the total number of months checked below:

☐ 1st Month $120 ☐ 2nd Month $460 ☐ 3rd Month $1050 ☐ 4th Month $1640

☐ The extension fee has already been filed in this application.

☐ (b) Applicant believes that no extension of time is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

Please charge to Deposit Account 08-2025 the sum of $ 510. At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account 08-2025 pursuant to 37 CFR 1.25. Additionally please charge any fees to Deposit Account 08-2025 under 37 CFR 1.16 through 1.21 inclusive, and any other sections in Title 37 of the Code of Federal Regulations that may regulate fees.

☒ A duplicate copy of this transmittal letter is enclosed.

Date: April 29, 2008

I hereby certify that this document is being filed by personal delivery to the Customer Service Window Randolph Building, 401 Dulany Street Alexandria, VA 22314, of the United States Patent & Trademark Office on the date indicated above.

By: PH C Kea Reg No 32,858
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Table of Contents

I. Real Party in Interest 2
II. Related Appeals and Interferences 2
III. Status Of Claims 2
IV. Status Of Amendments 2
V. Summary Of Claimed Subject Matter 2
VI. Grounds Of Rejection To Be Reviewed On Appeal 5
VII. Argument 5
VIII. Claims Appendix 8
IX. Evidence Appendix 8
X. Related Proceedings Appendix 9

I. Real Party in Interest

The present application is assigned to Hewlett-Packard Development Company, L.P. Hewlett-Packard Development Company, L.P. is the real party in interest.

II. Related Appeals and Interferences

None

III. Status Of Claims

Claims 1-13 remain pending. Claims 1 and 8 are independent claims. Claims 1-13 have been finally rejected, and this final rejection of claims 1-13 is the subject of this appeal. Appellants note that claims 2, 6, 7 and 12 have been indicated to contain allowable subject matter.

IV. Status Of Amendments

All prior amendments, including the last amendment filed July 18, 2007, have been entered. There are no pending amendments.

V. Summary Of Claimed Subject Matter

The subject matter of each independent claim on appeal (claims 1 and 8) is cross-referenced to the specification and/or drawing figures in the following table:

1. (Previously Presented) A method for network bandwidth utilization, comprising:	E.g. Spec. pg. 4, lines 29-31 Figs. 3, 4, 5
limiting a particular dataflow injected in a network from a dataflow source to a particular rate;	E.g. Spec. pg. 5, lines 5-6
marking datapackets, at a dataflow destination, with marks that depend on the level of any intervening network	E.g. Spec. pg. 4, lines 10-12 pg. 5, lines 22-28

congestion;	pg. 9, lines 24-25; 29-30 Fig. 3, block 302; Fig. 4, block 402; Fig. 5, block 502
returning packet marks from said dataflow destination to said dataflow source that indicate a degree of network congestion for said particular dataflow;	E.g. Spec. pg. 4, lines 13-15
increasing the rate of said particular dataflow according to an increase function if said packet marks being returned indicate no congestion; and	E.g. Spec. pg. 4, lines 20-23 pg. 5, lines 29-33 Figs. 3, 4, 5 Fig. 3, block 314; Fig. 4, block 414; Fig. 5, block 514
decreasing the rate of said particular dataflow according to a decrease function if said packet marks being returned do indicate congestion,	E.g. Spec. pg. 4, lines 16-20 pg. 5, lines 33-34 Fig. 3, block 306; Fig. 4, block 406; Fig. 5, block 506
wherein the increase function is adapted to recover the particular dataflow over a period of time after a decrease in the dataflow rate, the period of time being a constant value for at least two different dataflow rates.	E.g. Spec. pg. 5, lines 4-8 pg. 6, line 29-pg. 7, line 32
8. (Previously Presented) A network, comprising:	E.g. Fig. 1, 100
a source node providing for content to be sent to a destination node in a dataflow comprising a series of datapackets;	E.g., Fig. 1, 102 (server runs application 108) Spec. pg. 3, lines 31-33
a rate controller associated with the source node and able to control the rate of injection of said datapackets;	E.g., Fig. 1, rate limiter 116 Spec. pg. 4, lines 5-6
a congestion monitor associated with the destination node and providing for an assessment of whether individual said datapackets experienced network congestion in their respective individual travels from the source node to the destination node, and providing for the	E.g., Fig. 1 (acknowledgement monitor 128) Spec. pg 4, lines 11-18; lines 32-34

return of a feedback signal to the rate controller related to such assessment;	
wherein, the rate controller is responsive to said feedback signal and said rate of injection of said datapackets is adjusted to minimize congestion and maximize data throughput and,	E.g., congestion control; see spec. pg. 4, lines 18-22
the rate controller is adapted to recover the rate of injection over a period of time after a decrease in the rate, the period of time being a constant value for at least two different dataflow rates.	E.g., spec. pg. 5, lines 4-8 pg. 6, line 28-pg. 7, line 32

Appellants' Figure 1 illustrates an exemplary network environment 100 for achieving optimized bandwidth with minimal congestion. A dataflow increase function is adapted to recover dataflow, after a decrease in the dataflow rate, over a period of time which is a constant value for different dataflow rates. In Figure 1, a source server 102 communicates with a destination client 104 via a network 106. (see Spec. page 3, lines 28-30). A computer software application 108 running on source server can inject datapackets through a transport layer 110 across the network 106 to a corresponding transport layer 112 in client 104. Source server 102 can increase and decrease the rate of a particular dataflow injected in the network based on congestion signals in order to improve performance of network environment 100. See specification page 4, lines 32-34. Use of an increase function adapted to recover a dataflow over a constant value period of time for different dataflow rates is described, for example, in Appellants' specification at, for example, page 6, lines 28 to page 7, line 32.

Claim 1 encompasses the foregoing features, and is directed to a method for network bandwidth utilization. Claim 1 recites among other features, increasing the rate of said particular dataflow according to an increase function if said packet marks being returned indicate no congestion; and decreasing the rate of said particular dataflow according to a decrease function if said packet marks being returned do indicate congestion, wherein the increase function is adapted to recover the particular dataflow over a period of time after a decrease in the dataflow rate, **the period of time being a constant value for at least two different dataflow rates**.

Claim 8 recites a network containing similar features. For example, claim 8 recites a congestion monitor associated with the destination node and providing for an assessment of whether individual said datapackets experienced network congestion in their respective individual travels from the source node to the destination node, and providing for the return of a feedback signal to the rate controller related to such assessment; wherein, the rate controller is responsive to said feedback signal and said rate of injection of said datapackets is adjusted to minimize congestion and maximize data throughput and, the rate controller is adapted to recover the rate of injection over a period of time after a decrease in the rate, the period of time being a constant value for at least two different dataflow rates.

VI. Grounds Of Rejection To Be Reviewed On Appeal

A. Whether claims 1-13, Comply With 35 U.S.C. § 112, second paragraph.

B. Whether The Examiner Has Adequately Established That Independent Claims 1 And 8, And Dependent Claims 3-5, 9-11 And 13, Are Anticipated Under 35 U.S.C. § 102(e) By U.S. Patent No. 6,842,424 (Key et al).

VII. Argument

A. Claims 1-13 Comply With 35 U.S.C. § 112, second paragraph.

In rejecting claims 1-13 under 35 U.S.C. § 112, second paragraph on page 2 of the Final Office Action, the Examiner asserts that the phrase "recover the particular dataflow" in the last paragraph of claim 1 is unclear. This assertion is respectfully traversed, as "the particular dataflow" clearly, and unambiguously, refers to "the particular dataflow" recited in both the "increasing" and "decreasing" steps of claim 1. Thus, this rejection of claim 1 under 35 U.S.C. § 112 is improper and should be reversed.

The rejection under 35 U.S.C. § 112 on page 2 of the Final Office Action also states that the phrase "the period of time being a constant value for at least two different dataflow rates," as recited in claims 1 and 8, is unclear and that support for this phrase in the originally filed specification is unclear. On page 3 of the Final Office Action, the Examiner addresses this rejection and asserts:

> It appears this limitation may arise from the discussion in paragraph beginning on page 6 of the Specification; however, this section makes it clear that the time behavior of the increase function for two arbitrary initial rates is identical except for a shift in the time origin. Thus, there is no support in the Specification for "the period of time being a constant value for at least two different dataflow rates", since the period of time is actual different by a shift in the time origin.

This rejection is respectfully traversed.

The foregoing claim 1 phrase clearly and unambiguously states that the period of time associated with at least two different dataflow rates is a constant value. Such a feature encompasses the "recovery time/time duration T_{rec} (r)" as described at specification page 6, lines 28-31, and the function described at specification, page 6, line 32 to page 7, line 32. Specification page 7, line 5 describes a constant recovery time with reference to T_{rec} of lines 3-4 for two different rates r_1 and r_2 (see lines 6-10). Specification page 7, line 5 specifically refers to a recovery time which "is a constant $1/R_{min}$ for all rates higher than R'_{min}." See also specification page 7, lines 31-32: "Such is the constant recovery time T_{rec} from relaxed convergence requirement, Equation [2]."

In claims 1 and 8, the "period of time being a constant value for at least two different dataflow rates" refers to a recovery time. Following a decrease in dataflow rates, two different dataflow rates will be restored to original rates at the same time, such that a constant recovery period will occur for the different rates. The Examiner's reference on page 4 of the Final Office Action to "two arbitrary initial rates" being "identical except for a shift in the time origin" appears to reflect a misunderstanding of the invention as disclosed. In accordance with exemplary embodiments, any two dataflows with different rates will share the same recovery time period, as described at specification page 6, lines 32 to page 7, line 9.

Thus, reversal of the rejection under 35 U.S.C. § 112 with respect to independent claims 1 and 8 is requested.

B. The Examiner Has Not Adequately Established That Independent Claims 1 and 8, And Dependent Claims 3-5, 9-11 And 13, Are Anticipated Under 35 U.S.C. § 102(e) By U.S. Patent No. 6,842,424 (Key et al).

The Examiner's rejection of claims 1, 3-5, 8-11 and 13 under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,842,424 to *Key et al.* ("Key") is improper, as Key fails to disclose each element of independent claims 1 and 8. Although the Examiner objected to claims 2, 6, 7 and 12 as being allowable, independent claims 1 and 8 recite features which are not disclosed in the Key patent.

The Examiner refers to claim 1 in the last sentence on page 4 of the Final Office Action as follows:

> Key et al. also discloses the increase function being adapted to recover the particular dataflow rate over a constant period of time after a decrease in the dataflow rate regardless of the current dataflow rate. **(See column 2 lines 58-65 of Key et al for reference to using linear functions to increase a congestion window size after a decrease meaning the increase to a particular dataflow rate will take a constant time shifted by an initial time regardless of the current dataflow rate).** (Emphasis in original.)

Column 2, lines 58-65 of the Key patent and, in particular, line 65, specifically describe the functionality of the Key patent as "a linear increase phase", as is clearly acknowledged by the Examiner. Those skilled in the art will appreciate, however, that a linear increase phase will not perform the Appellants' claim 1 function of a recovery period of time with "the period of time being a constant value for at least two different dataflow rates." (See claim 1).

To the contrary, according to the functionality described in the Key patent, if a first dataflow rate is cut in half, (e.g., 100 to 50), and a second rate flowrate is similarly cut in half (e.g., 50 to 25), then the recovery of the first dataflow rate, in a linear phase system, will occur over different periods of time (i.e., the first dataflow rate will take twice as long to recover from 50 to 100 than the second dataflow rate will require to recover from 25 to 50).

In contrast, exemplary embodiments of the present invention, as described above in connection with the rejection under 35 U.S.C. §112, are directed to having different dataflow rates **recover** over a period of time which is a "constant value." Such functionality is not disclosed by the Key patent. Claim 1 is therefore patentably distinct over the Key patent.

Claim 8, although of different scope than claim 1, recites a similar feature and is also allowable for similar reasons. All of the remaining claims are dependent, and are similarly allowable.

CONCLUSION

Reversal of the Final Rejection of claims 1-13, and allowance of the present application, are requested.

VIII. Claims Appendix

See attached Claims Appendix for a copy of the claims involved in the appeal.

IX. Evidence Appendix

See attached Evidence Appendix for copies of evidence relied upon by Appellant.

X. Related Proceedings Appendix

See attached Related Proceedings Appendix for copies of decisions identified in Section II, supra.

Respectfully submitted,

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VIII. CLAIMS APPENDIX

The Appealed Claims

1. (Previously Presented) A method for network bandwidth utilization, comprising:

limiting a particular dataflow injected in a network from a dataflow source to a particular rate;

marking datapackets, at a dataflow destination, with marks that depend on the level of any intervening network congestion;

returning packet marks from said dataflow destination to said dataflow source that indicate a degree of network congestion for said particular dataflow;

increasing the rate of said particular dataflow according to an increase function if said packet marks being returned indicate no congestion; and

decreasing the rate of said particular dataflow according to a decrease function if said packet marks being returned do indicate congestion,

wherein the increase function is adapted to recover the particular dataflow over a period of time after a decrease in the dataflow rate, the period of time being a constant value for at least two different dataflow rates.

2. (Previously Presented) The method of claim 1, wherein:

the step of increasing is such that said increasing function can be mathematically represented as, $f_{inc}(r) = \mathrm{Min}(r * m^{R_{min}/r}, R_{max})$,

where,

r is the datapacket injection rate;

$f_{inc}(r)$ is the increase function;

m is a constant greater than one;

R_{min} is a predetermined minimum injection rate;

R_{max} is a predetermined maximum injection rate; and

Min ( ) is a ceiling function.

3. (Original) The method of claim 1, wherein:

the step of decreasing is such that said decreasing function can be mathematically represented as, $f_{dec}(r) = Max(r/m, R_{min})$,

where:

$f_{dec}(r)$ is the rate decrease function; and

Max ( ) is a floor function.

4. (Original) The method of claim 1, wherein:

the step of decreasing is such that said decreasing function linearly enlarges an inter-datapacket delay.

5. (Original) The method of claim 1, wherein:

the step of increasing is such that said increasing function linearly reduces an inter-datapacket delay.

6. (Original) The network source node of claim 4, wherein:

rate increase function can be mathematically represented as:

$f_{inc}(r) = \mathrm{Min}(r/(1 - R_{min}/R_{max}), R_{max})$

where:

r is the datapacket injection rate;

$f_{inc}(r)$ is the fast increase function;

R_{min} is the predetermined minimum injection rate;

R_{max} is a predetermined maximum injection rate; and

Min ( ) is a ceiling function.

7. (Original) The network source node of claim 5, wherein:

rate decrease function can be mathematically represented as:

$f_{dec}(r) = \mathrm{Max}(R_{max}/(1 + R_{max}/r), R_{min})$

where:

r is the datapacket injection rate;

$f_{dec}(r)$ is the rate decrease function;

R_{min} is the predetermined maximum injection rate; and

R_{max} is a predetermined maximum injection rate; and

Max ( ) is a floor function.

8. (Previously Presented) A network, comprising:

a source node providing for content to be sent to a destination node in a dataflow comprising a series of datapackets;

a rate controller associated with the source node and able to control the rate of injection of said datapackets;

a congestion monitor associated with the destination node and providing for an assessment of whether individual said datapackets experienced network congestion in their respective individual travels from the source node to the destination node, and providing for the return of a feedback signal to the rate controller related to such assessment;

wherein, the rate controller is responsive to said feedback signal and said rate of injection of said datapackets is adjusted to minimize congestion and maximize data throughput and,

the rate controller is adapted to recover the rate of injection over a period of time after a decrease in the rate, the period of time being a constant value for at least two different dataflow rates.

9. (Original) The network of claim 8, wherein:

the congestion monitor returns an acknowledgement (ACK) datapacket to the source node for each reception.

10. (Original) The network of claim 9, wherein:

the congestion monitor is such that the return ACK datapackets are marked according to whether congestion was encountered in the delivery to the destination node.

11. (Original) The network of claim 8, wherein:

the rate controller is such that several dataflows can be independently and simultaneously controlled.

12. (Previously Presented) The network of claim 8, wherein:

the rate controller is such that increases allowed in said injection rate can be mathematically represented as,

$$f_{inc}(r) = \mathrm{Min}(r * m^{R_{min}/r}, R_{max}),$$

where,

r is the datapacket injection rate;

$f_{inc}(r)$ is the increase function;

m is a constant greater than one;

R_{min} is a predetermined minimum injection rate;

R_{max} is a predetermined maximum injection rate; and

Min ( ) is a ceiling function.

13. (Original) The network of claim 8, wherein:

the rate controller is such that decreases made in said injection rate can mathematically represented as, $f_{dec}(r) = \mathrm{Max}(r/m, R_{min})$,

where:

$f_{dec}(r)$ is the rate decrease function; and

Max ( ) is a floor function.

IX. EVIDENCE APPENDIX

None

X. RELATED PROCEEDINGS APPENDIX

None